

PROJECT NUMBER: 1704
PROJECT TITLE: Supercritical Fluid Processes
PROJECT LEADER: T. M. Howell
PERIOD COVERED: November, 1989

I. LOW NICOTINE

A. Objective: Support to ART Commercial Plant.

B. Results: The CO₂ - tobacco hydraulic tests scheduled at The University of Texas have been completed. Twelve runs were conducted to study the effects of tobacco OV, packing density, fluid velocity ramp rate, bed freeboard, and CO₂ fill procedure on "rat hole" formation and pressure drop across the filler bed. As expected reducing filler OV and decreasing the bed packing density had the greatest effect on reducing pressure drop at a given flow rate. No definite conclusions could be reached on how flow rate influenced pressure drop because of wall effects from the three inch column. Other observations made during the experiments are shown below.

- 1) The tobacco moved as a "slug" through the column. Typically the bed lifted when the CO₂ velocity was between 3.5 to 4.5 ft/min. Generally the bed split at less than a foot from the bottom.
- 2) Tobacco did not float in liquid CO₂.
- 3) No entrainment of tobacco particles was seen to occur even at fluid velocities of 4 to 5 ft/min.
- 4) Filling the system with liquid CO₂ during start-up caused "bumping" of the tobacco bed which did not occur with hot gas filling.

C. Plans: The experiments were recorded on video and presented to management. A report has been issued.

II. LOW NICOTINE

A. Objective: Support ART Commercial Plant corrosion studies.

B. Results: A Dewlux 20 Moisture Analyzer (Stephens Equipment Co.) was evaluated for measuring the amount of solubilized water in CO₂ at process conditions. Several adjustments of sampling conditions, sampling hardware, and standard amounts did not yield reproducible data. It was recommended that the test be discontinued and the instrument returned to the vendor as not being suitable for our application.

C. Plans: Continue to investigate other methods and equipment for moisture analysis in SC-CO₂.

III. LOW NICOTINE

- A. Objective:** Develop second generation processing for ART.
- B. Results:** At the request of The Analytical Research Division runs were made on the one-liter liquid absorber system to obtain scrubber solutions of pure water and 4% monopotassium citrate. The solutions will be analyzed for differences in SC-CO₂ soluble tobacco components, other than nicotine, which may partition into the liquid phase. The runs were made at current ART conditions using DL5 filler.
- C. Plans:** Work is on-going.

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